

U.S. Pat. Appl'n. No. 10/736,284
Transmittal of Corrected Section dated September 10, 2004

CHANGES TO THE CLAIMS

1. (Original) A skid steer vehicle comprising:

a chassis having an engine fixed thereto and a hydraulic pump coupled to the motor to provide hydraulic fluid under pressure, the chassis having a left side and a right side;

left front and right front suspensions supporting the front of the vehicle including left front and right front forwardly-extending gearboxes pivotally coupled to the left and right sides of the chassis at the rear of the front gearboxes, a left front wheel mounted to the forward end of the left front gearbox and a right front wheel mounted to the forward end of the right front gearbox;

left rear and right rear suspensions supporting the rear of the vehicle, including left rear and right rear rearwardly-extending gearboxes pivotally coupled to the left and right sides of the chassis at the front of the rear gearboxes, a left rear wheel mounted to the rear end of the left rear gearbox and a right rear wheel mounted to the rear end of the right rear gearbox;

a left side hydraulic motor assembly fixed to the left side of the chassis of the vehicle and drivingly coupled to the left front and left rear gearboxes to drive the left front and left rear wheels in rotation; and

a right side hydraulic motor assembly fixed to the right side of the chassis of the vehicle and drivingly coupled to the right front and right rear gearboxes to drive the right front and right rear wheels in rotation.

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2. (Original) The vehicle of claim 1, wherein the left front, left rear, right front and right rear gearboxes include an input gear at a first end thereof and an axle at a second end thereof.

3. (Original) The vehicle of claim 2, further comprising:

a left front flexible coupling disposed between and coupled to the left side hydraulic motor assembly and left front gearbox;

a right front flexible coupling disposed between and coupled to the right side hydraulic motor assembly and right front gearbox;

a left rear flexible coupling disposed between and coupled to the left side hydraulic motor assembly and left rear gearbox; and

a right rear flexible coupling disposed between and coupled to the right side hydraulic motor assembly and right rear gearbox.

4. (Original) The vehicle of claim 3, wherein the two front gearboxes pivot with respect to the chassis about a common front pivotal axis; wherein the two rear gearboxes pivot with respect to the chassis about a common rear pivotal axis; wherein the two front axles are coaxial in at least one gearbox pivotal position; and wherein the two rear axles are coaxial in at least one gearbox pivotal position.

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5. (Original) The vehicle of claim 1, wherein each of the four gearboxes includes a casing comprising an inner and an outer casing in which a plurality of gear sets are supported, including at least one bevel gear set.
6. (Original) The vehicle of claim 4, wherein the common front pivotal axis intersects both the left front and the right front couplings, and further wherein the common rear pivotal axis intersects the left rear and the right rear pivotal couplings.
7. (Original) The vehicle of claim 5, wherein each of the four gearbox casings includes a cylindrical member extending from the casing to engage a sidewall of the chassis.
8. (Original) The vehicle of claim 2, wherein all four axles of the four gearboxes and the common front and rear pivotal axes are coplanar in at least one pivotal position of the four gearboxes.
9. (Original) A vehicle suspension for one side of a vehicle, the vehicle having a chassis with a left side, a right side, a front end and a rear end, the suspension comprising:
a forward gearbox having a front and a rear end, wherein the rear end is pivotally coupled to the chassis to permit the front end of the forward gearbox to move up and down, the forward gearbox having at least one speed-reducing bevel gear set and a front axle extending laterally away from the front of the forward gearbox the forward gearbox

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being pivotable about a first pivotal axis with respect to the chassis;

a front wheel fixed to the front axle to rotate about a front wheel axis of rotation;

a rear gearbox behind the forward gearbox having a front and a rear end, wherein the front end of the rear gearbox is pivotally coupled to the chassis to permit the rear end of the rear gearbox to move up and down, the rear gearbox having at least one speed-reducing bevel gear set and a rear axle extending from the rear of the rear gearbox, the rear gearbox being pivotable about a second pivotal axis with respect to the chassis;

a rear wheel fixed to the rear axle to rotate about a rear wheel axis of rotation; and

a hydraulic motor assembly fixed to the vehicle chassis at a location between the rear end of the front gearbox and the front end of the rear gearbox, the motor assembly being drivingly connected to the forward and rear gearboxes to drive the front and rear wheels.

10. (Original) The vehicle suspension of claim 9, further comprising two flexible couplings, the first of the two couplings being drivingly coupled to and between the forward gearbox and the motor assembly to permit the forward gearbox to pivot with respect to the motor assembly, and the second of the two couplings being drivingly coupled to and between the motor assembly and the rear gearbox to permit the rear gearbox to pivot with respect to the motor assembly.

11. (Original) The vehicle suspension of claim 10, wherein the two flexible couplings are double Hooke's joints.

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12. (Original) The vehicle suspension of claim 11, wherein the first of the flexible couplings is constrained to flex about the first pivotal axis and the second of the flexible couplings is constrained to pivot about the second pivotal axis.

13. (Original) The vehicle suspension of claim 12, wherein the front axle, the rear axle, the first pivotal axis and the second pivotal axis are parallel and horizontal.

14. (Original) The vehicle suspension of claim 13, wherein the hydraulic motor assembly rotates a motor driveshaft about a rotational axis, and further wherein the motor assembly rotational axis is perpendicular to and intersects the first and second pivotal axes.

15. (Original) The vehicle suspension of claim 14, wherein each of the forward and rear gearboxes includes a cast iron casing comprising an inner and an outer casing that are fixed together to enclose and support the at least one speed-reducing bevel gear set and at least another speed-reducing gear set.

16. (Original) The vehicle suspension of claim 15, wherein each of the forward and rear gearbox casings includes a cylindrical member extending from the casing to engage a sidewall of the chassis, the cylindrical member forming a part of a pivotal coupling.

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17. (Original) The vehicle suspension of claim 16, wherein the axles of the forward and rear gearboxes and the first and second pivotal axes are coplanar in at least one pivotal position of the forward and rear gearboxes.

18. (Original) The vehicle suspension of claim 10, wherein the two flexible couplings include Garden joints.

19. (Original) The vehicle suspension of claim 10, wherein the two flexible couplings include constant velocity joints.

20. (Original) The vehicle suspension of claim 10, wherein the two flexible couplings include universal joints.

21. (New) A skid steer vehicle, comprising:

a chassis including first and second sidewalls;

an engine mounted to the chassis, the engine including at least first and second hydraulic pumps; and

first and second drive systems, disposed adjacent to the first and second sidewalls, respectively, each drive system including:

a hydraulic motor including an output shaft with first and second ends and an axis of rotation;

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a first axle housing coupled to the first end of the output shaft, the first axle housing housing at least first, second and third reduction gear sets and at least part of a first axle that extends laterally outward away from the first axle housing;

a second axle housing coupled to the second end of the output shaft, the second axle housing housing at least fourth, fifth and sixth reduction gear sets and at least part of a second axle that extends laterally outward away from the second axle housing;
and

two wheels, each wheel being driven by one of the first and second axles;
wherein the hydraulic motor of the first drive system is fluidly coupled to the first hydraulic pump to be driven thereby and the hydraulic motor of the second drive system is fluidly coupled to the second hydraulic pump to be driven thereby.

22. (New) The vehicle of Claim 21, wherein at least one of the first, second and third gear sets is a bevel gear set and wherein at least one of the fourth, fifth and sixth gear sets is a bevel gear set.

23. (New) The vehicle of Claim 21, wherein the output shaft of the hydraulic motor extends fore-and-aft.

24. (New) The vehicle of Claim 21, wherein the first and second axles are parallel to one another and extend laterally away from the vehicle and further wherein the first axle is

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parallel to at least two internal gear shafts in the first axle housing and the second axle is parallel to at least two internal gear shafts in the second axle housing.

25. (New) The vehicle of Claim 21, wherein the first axle housing houses at least one bevel gear that is engaged to the output shaft of the hydraulic motor to rotate coaxially therewith and at the same rotational speed and further wherein the second axle housing houses at least one bevel gear that is engaged to the output shaft of the hydraulic motor to rotate coaxially therewith and at the same rotational speed.

26. (New) The vehicle of Claim 21, wherein the gear reduction ratios of the first, second and third gear sets are the same as the gear reduction ratios of the fourth, fifth and sixth gear sets, respectively.

27. (New) The vehicle of Claim 21, wherein the first and second axle housings of the first drive system are fixed to the outer surface of the first sidewall, and wherein the first and second axle housings of the second drive system are fixed to the outer surface of the second sidewall.

28. (New) The vehicle of Claim 21, wherein the hydraulic motor of the first drive system is disposed between the first and second axle housings of the first drive system and wherein the hydraulic motor of the second drive system is disposed between the first and second axle housings of the second drive system.

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29. (New) A drive system for a skid steer vehicle, comprising:
- a hydraulic motor including an output shaft having an axis of rotation;
 - a first axle casing coupled to a first end of the output shaft, the first axle casing including a first housing, at least first, second and third reduction gear sets and a first axle that extends laterally outward away from the first housing;
 - a second axle casing coupled to a second end of the output shaft, the second axle casing including a second housing, at least fourth, fifth and sixth reduction gear sets and a second axle that extends laterally outward away from the second housing; and
 - two wheels, each wheel being driven by one of the first and second axles.
30. (New) The vehicle of Claim 29, wherein at least one of the first, second and third gear sets is a bevel gear set and wherein at least one of the fourth, fifth and sixth gear sets is a bevel gear set.
31. (New) The vehicle of Claim 29, wherein the output shaft of the hydraulic motor extends fore-and-aft.
32. (New) The vehicle of Claim 29, wherein the first and second axles are parallel to one another and extend laterally away from the vehicle and further wherein the first casing includes first and second internal shafts and the first axle is parallel to first and second internal shafts.

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33. (New) The drive system of Claim 29, wherein the first axle casing includes a first internal shaft that is disposed parallel to the first axle and further wherein the second reduction gear set includes a first spur gear mounted on the first axle and a second spur gear mounted on the first internal shaft.

34. (New) The drive system of Claim 32, wherein the first axle casing includes at least one bevel gear that is coupled to the output shaft of the hydraulic motor to rotate coaxially therewith and at the same rotational speed and further wherein the second axle casing includes at least one bevel gear that is coupled to the output shaft of the hydraulic motor to rotate coaxially therewith and at the same rotational speed.

35. (New) The drive system of Claim 29, wherein the gear reduction ratios of the first, second and third gear sets are the same as the gear reduction ratios of the fourth, fifth and sixth gear sets, respectively.

36. (New) The drive system of Claim 29, wherein the first and second axle housings of the first drive system are configured to be fixed to the outer surface of a first sidewall of the vehicle.

37. (New) The drive system of Claim 29, wherein the hydraulic motor of the first drive system is disposed between the first and second axle housings of the first drive system.

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38. (New) The drive system of Claim 29, wherein the first axle casing includes first and second internal shafts, the first internal shaft being disposed parallel to the first axle, the second reduction gear set including a first spur gear mounted on the first axle and a second spur gear mounted on the first internal shaft, the third reduction gear set including first and second bevel gears, the first bevel gear coupled to the output shaft of the hydraulic motor to rotate coaxially therewith and at the same rotational speed and the second bevel gear coupled to the second internal shaft.

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